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NEW MARKET SERVICES CORPORATION (FORMERLY ETHYL CORPORATION) 330 SOUTH 4TH STREET RICHMOND, VA 23219				
			EXAMINER GOLOBOY, JAMES C	
			ART UNIT 1714	PAPER NUMBER

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Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/734,034

Applicant(s)

MISHRA ET AL.

Examiner

James Goloboy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12/11/2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-44 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 5, 6, 12, 14, 17, 27, 29, 32, 36, 38, and 41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 6 refers to the "polymerization product" of claim 1. There is no antecedent basis for "polymerization product" in Claim 1. The only polymer recited in Claim 1 is the viscosity index improving copolymer; however, the "polymerization product" of Claim 6 actually refers to the hydrocarbyl substituent of the succinimide dispersant. It is recommended that Claim 6 be made dependent on Claim 5 instead of Claim 1.

b. Claims 5, 12, 14, 17, 27, 29, 32, 36, 38, and 41 refer to a reaction mixture including "from about 35 to about 45 weight percent isobutylene and from about 55 to about 65 weight percent raffinate I stream". It is not clear whether the 35-45% isobutylene includes the isobutylene present in the raffinate I stream, or is a separate component. Both interpretations are considered in the rejections below.

### ***Claim Rejections - 35 USC § 102***

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3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3 and 8-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Crawford (GB 2,048,935A).

Crawford, in the abstract, discloses a lubricant composition consisting of a lubricating oil, a dispersant derived from a hydrocarbyl-substituted succinimide, and a viscosity index improver comprising a block copolymer of a monoalkenylarene monomer and a conjugated diene monomer. On page 2 line 52 Crawford discloses that the number average molecular weight of the copolymer may be in the range of 50,000 to 100,000, falling within the range recited in Claim 1. Crawford further discloses on page 2 line 40 that the copolymer may contain from 5 to 50% by weight of the aromatic monomer, with the 50% endpoint anticipating the range recited in Claim 1. Crawford also shows on page 2 lines 42-47 that the copolymer is hydrogenated so that more than 95% of the olefinic bonds are saturated, leading to an olefinic unsaturation of up to 5%, as in the range recited in Claim 1. On page 4 lines 26-28, Crawford shows that the additives may be present in a concentration as low as 0.6% (0.1%+0.5%), therefore forming a minor amount of the composition, while the remainder is a major amount of lubricating oil. The lubricant composition disclosed by Crawford therefore meets all the limitations of Claim 1.

In the abstract, Crawford discloses that viscosity improving copolymer may be formed from isoprene and styrene monomers, as recited in Claims 2-3. An isoprene/styrene copolymer is inherently non-shear stable, as in Claim 10. Crawford discloses on page 4 lines 26-28 a concentration of 1 to 20% by weight of the polymeric dispersant, with the lower bound anticipating that of the range recited in Claim 8. On page 5 lines 25-30 (Examples 11-13), Crawford discloses lubricant compositions comprising 5, 6, and 7% by weight of the viscosity index improver, anticipating the concentrations recited in Claim 8.

On page 4 lines 18-25 Crawford teaches that the lubricant base oil may comprise a synthetic lubricating oil or a mineral lubricating oil, as recited in Claim 9. The oil may be a solvent neutral oil, which is a refined oil.

### ***Claim Rejections - 35 USC § 103***

*The rejections below have been placed in the following sequence. Rejections of claims dealing with the components of the lubricant composition and their use are listed first, in paragraphs 7-12. Rejections of claims dealing with the reactants used to form hydrocarbyl substituents follow in paragraphs 13-22.*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1, 7, 11, 13, 15-16, and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Papay (U.S. Pat. No. 5,652,201).

The discussion of Crawford in paragraph 4 above is incorporated here by reference. The differences between Crawford and the currently presented claims are:

i) Crawford does not disclose a Mannich adduct derived from hydrocarbyl-substituted phenols, aldehydes, and polyethylene polyamines, or a hydrocarbyl-substituted amine dispersant. This relates to claims 1, 7 and 16.

ii) Crawford does not disclose an additive comprising more than one dispersant. This relates to claims 11, 13, 15-16, and 18-19.

iii) Crawford does not disclose a post-treated dispersant. This relates to Claim 15.

With respect to i), Papay, from column 20 line 64 through column 21 line 4, discloses a Mannich polyamine dispersant comprising an alkylphenol, an aldehyde, and a polyamine, and in column 22 line 31 teaches that the polyamine may be triethylene tetramine, which is a polyethylene polyamine. The dispersant taught by Papay therefore

meets Claims 1 and 7. From column 18 line 24 through column 20 line 63 Papay teaches a hydrocarbyl-substituted amine dispersant, as recited in Claim 1.

With respect to ii), Papay discloses in columns 15 through 24 Mannich polyamine dispersants, hydrocarbyl-substituted amine dispersants, and hydrocarbyl-substituted succinimide dispersants, as recited in Claim 11. In column 28 line 14 (Example B-2) a succinimide dispersant with a hydrocarbyl substituent of molecular weight 1,150 is taught, while in column 28 line 22 the molecular weight of the hydrocarbyl substituent is 2,100. The molecular weight of these substituents fall within those ranges recited on lines 13-14 and line 16 of Claim 11 respectively. Papay further discloses in columns 24 and 25 that the lubricant may comprise a mixture of dispersants comprising dispersants of the same type, or dispersants of different types. The dispersants in this section of Papay are phosphorylated; however, the reference also discloses from column 44 line 57 through column 45 line 10 that multiple nonphosphorylated dispersants of the types described above may also be included in the lubricant composition. The mixtures of dispersants disclosed by Papay therefore meet the limitations recited in Claims 11, 13 and 16, while the mixtures of dispersants combined with the isoprene/styrene viscosity improver disclosed by Crawford meet Claims 18 and 19.

With respect to iii), Papay shows in column 23 lines 29-51 that the hydrocarbyl-substituted succinimides disclosed in columns 15 through 18 may be post treated, as recited in Claim 15.

It would have been obvious to one of ordinary skill in the art to include in Crawford a mixture of dispersants, as taught by Papay, in order to further improve

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dispersancy. It would have been obvious to use a Mannich adduct dispersant, as they are common dispersants in the lubricant industry. It would have been obvious to include a post treated dispersant for the purpose of imparting improved dispersancy or detergency properties to the dispersant.

8. Claims 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Lambert (U.S. Pat. No. 5,888,947).

The discussion of Crawford in paragraph 4 above is incorporated here by reference. Crawford differs from the currently presented claims in the following ways:

i) Crawford does not disclose a method for reducing wear in moving parts with the lubricant composition. This relates to Claims 20-22.

ii) Crawford does not disclose an internal combustion engine. This relates to Claim 23.

With respect to i), Lambert teaches in column 1 lines 21-28 that metal-to-metal contact between moving engine parts leads to wear, and in lines 29-33 teaches that lubricants can reduce wear between moving parts by forming a film between them. Using the lubricant composition of Crawford in the method of reducing wear taught by Lambert meets claims 20-22.

With respect to ii), Lambert teaches in the reference's Claim 11 that the lubricant can be used in an internal combustion engine, and in the reference's Claim 18 more specifically discloses that it may be used in a diesel internal combustion engine.



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It would have been obvious to use the lubricant composition of Crawford to contact moving parts in an internal combustion engine in order to reduce wear on the moving parts, as taught by Lambert in column 1 lines 21-33 and Lambert's Claims 11 and 18.

9. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Lambert as applied to claims 20-23 above, and further in view of Galka (U.S. Pat. No. 6,427,647).

The discussion of Crawford in view of Lambert in paragraph 8 above is incorporated here by reference. Crawford in view of Lambert does not disclose the use of the lubricant composition in a gasoline internal combustion engine.

Galka discloses an internal combustion engine, and in column 3 line 34 teaches that gasoline may be used to power the engine. Galka also shows in column 2 line 17 that lubricant is delivered to the moving parts of the engine.

It would have been obvious to one of ordinary skill in the art to modify Crawford in view of Lambert to include a gasoline internal combustion engine, as taught by Galka, in order to increase the life of engines in gasoline-powered vehicles and tools.

10. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Lambert as applied to claim 20 above, and further in view of Albertson (U.S. Pat. No. 3,653,273).

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The discussion of Crawford in view of Lambert paragraph 8 above is incorporated here by reference. Crawford in view of Lambert does not disclose the use of the lubricant composition in a vehicle transmission.

Albertson discloses a transmission for a vehicle, namely a bicycle as described in column 1 line 6, and in column 2 lines 52-53 teaches that lubricant is transmitted to the moving parts of the transmission as in Claim 24.

It would have been obvious to one of ordinary skill in the art to modify Crawford in view of Lambert to include a vehicle transmission, as taught by Galka, in order to reduce wear and increase the life of parts in vehicle transmissions.

11. Claims 25-26, 28, 30-31, 33-35, 37, 39-40, and 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Papay as applied to claims 1, 7, 11, 13, 15-16, and 18-19 above, and further in view of Lambert.

The discussion of Crawford in view of Papay in paragraph 7 above is incorporated here by reference. The discussion of Crawford in view of Lambert in paragraph 8 above is also incorporated here by reference. Papay also discloses in column 7 lines 50-52 that the lubricant composition is preferably used in the crankcase of a gasoline engine, as recited in Claims 26 and 42, and more specifically states in column 47 line 53-54 that it can be used as an automotive crankcase oil, or as an automatic transmission fluid, as recited in Claim 44. An engine is part of a vehicle's drive train, as recited in Claim 43. Crawford in view of Papay does not disclose a method for reducing wear in moving parts with the lubricant composition.

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Lambert teaches in column 1 lines 21-28 that metal-to-metal contact between moving engine parts leads to wear, and in lines 29-33 teaches that lubricants can reduce wear between moving parts by forming a film between them. Using the lubricant composition of Crawford in view of Papay in the method of reducing wear taught by Lambert meets claims 25-26, 28, 30-31, 33-35, 40, and 42-44.

It would have been obvious to use the lubricant composition of Crawford in view of Papay to contact moving parts in an vehicle, such as the crankcase disclosed by Papay, in order to reduce wear on in the moving parts, as taught by Lambert in column 1 lines 21-33.

12. Claims 25-26, 28, and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Papay further in view of Lambert as applied to claims 25-26, 28, and 30-32 above, and further in view of Galka.

The discussion of Crawford in view of Papay further in view of Lambert in paragraph 11 above is incorporated here by reference. The claims rejected in paragraph 11 are dependent on Claim 23, which recites the use of the lubricant composition within a gasoline or diesel internal combustion engine; however, Lambert discloses only a diesel engine.

Galka discloses an internal combustion engine, and in column 3 line 34 teaches that gasoline may be used to power the engine. Galka also shows in column 2 line 17 that lubricant is delivered to the moving parts of the engine, meeting the cases of claims 25-26, 28, and 30-31 where the engine is a gasoline engine.

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It would have been obvious to one of ordinary skill in the art to modify Crawford in view of Papay further in view of Lambert to include a gasoline internal combustion engine, as taught by Galka, in order to increase the life of engines in gasoline-powered vehicles and tools.

13. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Samson (U.S. Pat. No. 4,605,808).

The discussion of Crawford in paragraph 4 above is incorporated by reference. Crawford does not disclose a polymerization product of raffinate I stream and isobutylene having an average molecular weight of 800 to 1200 and more than 70 mol% of a terminal vinylidene group.

Samson discloses a process for making polyisobutylene from 1-olefins. In column 2 lines 18-19 Samson discloses that the product has at least a 70 mol% vinylidene content. Samson also discloses in column 3 lines 29-30 a preferred range of between 750 and 2500 for the molecular weight of the polymer, encompassing the range recited in Claim 4, and in column 4 line 37 (Example 1) shows a molecular weight of 955 for a sample polyisobutylene polymer, falling within the range recited in Claim 4.

In column 2 lines 35-49 Samson discloses the range of starting materials that may be utilized in the polymerization. The reference discloses that a mixed C<sub>4</sub> hydrocarbon feedstock such as raffinate I, preferably with at least 40% by weight of isobutene, is useful, as is pure isobutene, and by implication feedstocks with intermediate concentrations of isobutene are also usable as starting materials. If Claim

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5 is considered to mean that the entire reactant composition comprises 35 to 45% isobutene, the range disclosed by Samson strongly overlaps the claimed range, with the endpoint of 40% precisely in the middle of the claimed range. If the 35 to 45% isobutene recited in Claim 5 is instead considered to be in addition to the isobutene contained in the raffinate I, the range disclosed by Samson encompasses the composition recited in claim 5, as raffinate I is known in the art to comprise up to about 50% isobutene.

It would have been obvious to one of ordinary skill in the art to make the substituent on the hydrocarbyl-substituted succinimide of Crawford by using the reactants taught by Samson in order to obtain a higher vinylidene content and therefore increased reactivity, as taught on lines 8-10 of Samson's abstract.

14. Claims 12, 14, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Papay as applied to claims 11, 13, and 16 above, and further in view of Samson.

The discussion of Crawford in view of Papay in paragraph 7 above is incorporated here by reference. Crawford in view of Papay does not disclose a polymerization product of raffinate I stream and isobutylene having an average molecular weight of 800 to 1200 and more than 70 mol% of a terminal vinylidene group.

Samson discloses a process for making polyisobutylene from 1-olefins. In column 2 lines 18-19 Samson discloses that the product has at least a 70 mol% vinylidene content. Samson also discloses in column 3 lines 29-30 a preferred range of between 750 and 2500 for the molecular weight of the polymer, encompassing the

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ranges recited for both dispersants in Claim 11, and in column 4 line 37 (Example 1) shows a molecular weight of 955 for a sample polyisobutylene polymer, falling within the range recited for one dispersant in Claim 11.

In column 2 lines 35-49 Samson discloses the range of starting materials that may be utilized in the polymerization. The reference discloses that a mixed C<sub>4</sub> hydrocarbon feedstock such as raffinate I, preferably with at least 40% by weight of isobutene, is useful, as is pure isobutene, and by implication feedstocks with intermediate concentrations of isobutene are also usable as starting materials. If Claims 12, 14, and 17 are considered to mean that the entire reactant composition comprises 35 to 45% isobutene, the range disclosed by Samson strongly overlaps the claimed range, with the endpoint of 40% precisely in the middle of the claimed range. If the 35 to 45% isobutene recited in Claim 5 is instead considered to be in addition to the isobutene contained in the raffinate I, the range disclosed by Samson encompasses the composition recited in claims 12, 14, and 17, as raffinate I is known in the art to comprise up to about 50% isobutene.

It would have been obvious to one of ordinary skill in the art to make the substituent on the hydrocarbyl-substituted succinimide of Crawford by using the reactants taught by Samson in order to obtain a higher vinylidene content and therefore increased reactivity, as taught on lines 8-10 of Samson's abstract.

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15. Claims 27, 29, 32, 36, 38, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Papay in view of Lambert as applied to claims 25, 28, 31, 33, 37, and 40 above, and further in view of Samson.

The discussion of Crawford in view of Papay further in view of Lambert in paragraph 11 above is incorporated here by reference. The discussion of Crawford in view of Papay in paragraph 7 above is incorporated here by reference. Crawford in view of Papay further in view of Lambert does not disclose a polymerization product of raffinate I stream and isobutylene having an average molecular weight of 800 to 1200 and more than 70 mol% of a terminal vinylidene group.

Samson discloses a process for making polyisobutylene from 1-olefins. In column 2 lines 18-19 Samson discloses that the product has at least a 70 mol% vinylidene content. Samson also discloses in column 3 lines 29-30 a preferred range of between 750 and 2500 for the molecular weight of the polymer, encompassing the ranges recited for both dispersants in Claims 25 and 33, and in column 4 line 37 (Example 1) shows a molecular weight of 955 for a sample polyisobutylene polymer, falling within the range recited for one dispersant in Claims 25 and 33.

In column 2 lines 35-49 Samson discloses the range of starting materials that may be utilized in the polymerization. The reference discloses that a mixed C<sub>4</sub> hydrocarbon feedstock such as raffinate I, preferably with at least 40% by weight of isobutene, is useful, as is pure isobutene, and by implication feedstocks with intermediate concentrations of isobutene are also usable as starting materials. If Claims 27, 29, 32, 36, 38, and 41 are considered to mean that the entire reactant composition

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comprises 35 to 45% isobutene, the range disclosed by Samson strongly overlaps the claimed range, with the endpoint of 40% precisely in the middle of the claimed range. If the 35 to 45% isobutene recited in Claim 5 is instead considered to be in addition to the isobutene contained in the raffinate I, the range disclosed by Samson encompasses the composition recited in claims 27, 29, 32, 36, 38, and 41, as raffinate I is known in the art to comprise up to about 50% isobutene.

It would have been one of ordinary skill in the art to make the substituents on the hydrocarbyl-substituted succinimide dispersants of Crawford in view of Papay by using the reactants taught by Samson in order to obtain a higher vinylidene content and therefore increased reactivity, as taught on lines 8-10 of Samson's abstract.

16. Claims 27, 29, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Papay in view of Lambert in view of Samson as applied to claims 27, 29, and 32 above, and further in view of Galka.

The discussion of Crawford in view of Papay in view of Lambert in view of Samson in paragraph 15 above is incorporated here by reference. Claims 27, 29, and 32 are dependent on Claim 23, which recites the use of the lubricant composition within a gasoline or diesel internal combustion engine; however, Lambert discloses only a diesel engine.

Galka discloses an internal combustion engine, and in column 3 line 34 teaches that gasoline may be used to power the engine. Galka also shows in column 2 line 17



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that lubricant is delivered to the moving parts of the engine, meeting the cases of claims 27, 29, and 32 where the engine is a gasoline engine.

It would have been obvious to one of ordinary skill in the art to modify Crawford in view of Papay in view of Lambert in view of Samson to include a gasoline internal combustion engine, as taught by Galka, in order to increase the life of engines in gasoline-powered vehicles and tools.

17. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Tokumoto (U.S. Pat. No. 6,300,444).

The discussion of Crawford in paragraph 4 above is incorporated by reference. Crawford does not disclose a polymerization product of raffinate I stream and isobutylene having an average molecular weight of 800 to 1200 and more than 70 mol% of a terminal vinylidene group.

Tokumoto discloses a process for making polyisobutylene from a C<sub>4</sub> hydrocarbon fraction. In columns 9-11 (Examples 1-6). Tokumoto discloses that the product has a vinylidene content well above 70 mol%. Tokumoto also discloses in the examples products with molecular weights either within or very close to the range of 800 to 1200 recited in Claim 4.

In Tokumoto's Claim 2, ranges are disclosed for the composition of the starting material that may be utilized in the polymerization. The reference's claim discloses a concentration of 35 to 70% by weight of isobutadiene in a mixed C<sub>4</sub> hydrocarbon feedstock. Raffinate I is recognized within the art to contain about 40 to 50% by weight

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isobutene. If the 35 to 45% isobutene recited in Claim 5 is considered to be in addition to the isobutene contained in the raffinate I, the overall concentration of isobutene in the composition recited in Claim 5 is between 61% ( $.65 * .4 + .35 = .61$ ) and 67% ( $.55 * .4 + .45 = .67$ ), which is well within the range of 35 to 70% claimed by Tokumoto.

It would have been obvious to one of ordinary skill in the art to make the substituent on the hydrocarbyl-substituted succinimide of Crawford by using the reactants taught by Samson in order to obtain a higher vinylidene content and therefore increased reactivity, as taught in column 1 lines 10-12 of Tokumoto.

18. Claims 12, 14, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Papay as applied to claims 11, 13, and 16 above, and further in view of Tokumoto.

The discussion of Crawford in view of Papay in paragraph 7 above is incorporated here by reference. Crawford in view of Papay does not disclose a polymerization product of raffinate I stream and isobutylene having an average molecular weight of 800 to 1200 and more than 70 mol% of a terminal vinylidene group.

Tokumoto discloses a process for making polyisobutylene from a C<sub>4</sub> hydrocarbon fraction. In columns 9-11 (Examples 1-6). Tokumoto discloses that the product has a vinylidene content well above 70 mol%. Tokumoto also discloses in the examples products with molecular weights either within or very close to the range of 800 to 1200 recited in Claim 11.

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In Tokumoto's Claim 2, ranges are disclosed for the composition of the starting material that may be utilized in the polymerization. The reference's claim discloses a concentration of 35 to 70% by weight of isobutadiene in a mixed C<sub>4</sub> hydrocarbon feedstock. Raffinate I is recognized within the art to contain about 40 to 50% by weight isobutene. If the 35 to 45% isobutene recited in Claims 12, 14, and 17 is considered to be in addition to the isobutene contained in the raffinate I, the overall concentration of isobutene in the composition recited in Claims 12, 14, and 17 is between 61% ( $.65 * .4 + .35 = .61$ ) and 67% ( $.55 * .4 + .45 = .67$ ), which is well within the range of 35 to 70% claimed by Tokumoto.

It would have been obvious to one of ordinary skill in the art to make the substituent on the hydrocarbyl-substituted succinimide of Crawford by using the reactants taught by Samson in order to obtain a higher vinylidene content and therefore increased reactivity, as taught in column 1 lines 10-12 of Tokumoto.

19. Claims 27, 29, 32, 36, 38, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Papay in view of Lambert as applied to claims 25, 28, 31, 33, 37, and 40 above, and further in view of Tokumoto.

The discussion of Crawford in view of Papay further in view of Lambert in paragraph 11 above is incorporated here by reference. The discussion of Crawford in view of Papay in paragraph 7 above is incorporated here by reference. Crawford in view of Papay further in view of Lambert does not disclose a polymerization product of

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raffinate I stream and isobutylene having an average molecular weight of 800 to 1200 and more than 70 mol% of a terminal vinylidene group.

Tokumoto discloses a process for making polyisobutylene from a C<sub>4</sub> hydrocarbon fraction. In columns 9-11 (Examples 1-6). Tokumoto discloses that the product has a vinylidene content well above 70 mol%. Tokumoto also discloses in the examples products with molecular weights either within or very close to the range of 800 to 1200 recited in Claim 25 and 33.

In Tokumoto's Claim 2, ranges are disclosed for the composition of the starting material that may be utilized in the polymerization. The reference's claim discloses a concentration of 35 to 70% by weight of isobutadiene in a mixed C<sub>4</sub> hydrocarbon feedstock. Raffinate I is recognized within the art to contain about 40 to 50% by weight isobutene. If the 35 to 45% isobutene recited in Claims 25, 28, 31, 33, 37, and 40 is considered to be in addition to the isobutene contained in the raffinate I, the overall concentration of isobutene in the composition recited in Claims 25, 28, 31, 33, 37, and 40 is between 61% ( $.65 * .4 + .35 = .61$ ) and 67% ( $.55 * .4 + .45 = .67$ ), which is well within the range of 35 to 70% claimed by Tokumoto.

It would have been obvious to one of ordinary skill in the art to make the substituent on the hydrocarbyl-substituted succinimide of Crawford by using the reactants taught by Samson in order to obtain a higher vinylidene content and therefore increased reactivity, as taught in column 1 lines 10-12 of Tokumoto.

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20. Claims 27, 29, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Papay in view of Lambert in view of Samson as applied to claims 27, 29, and 32 above, and further in view of Galka.

The discussion of Crawford in view of Papay in view of Lambert in view of Tokumoto in paragraph 19 above is incorporated here by reference. Claims 27, 29, and 32 are dependent on Claim 23, which recites the use of the lubricant composition within a gasoline or diesel internal combustion engine; however, Lambert discloses only a diesel engine.

Galka discloses an internal combustion engine, and in column 3 line 34 teaches that gasoline may be used to power the engine. Galka also shows in column 2 line 17 that lubricant is delivered to the moving parts of the engine, meeting the cases of claims 27, 29, and 32 where the engine is a gasoline engine.

It would have been obvious to one of ordinary skill in the art to modify Crawford in view of Papay in view of Lambert in view of Tokumoto to include a gasoline internal combustion engine, as taught by Galka, in order to increase the life of engines in gasoline-powered vehicles and tools.

21. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Papay further in view of Samson as applied to Claim 5 above, and further in view of Lundberg (U.S. Pat. No. 4,971,711).

The discussion of Crawford in view of Papay further in view of Samson in paragraph 13 above is incorporated here by reference. Crawford in view of Papay

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further in view of Samson does not disclose a ratio between 1.0:1.0 and 1.0:1.6 of polyisobutene to succinic acid.

Lundberg, in column 19 lines 36-37, discloses a ratio of between 1.0:1.0 and 1.0:1.5 of polyisobutylene to succinic acid in a hydrocarbyl-substituted succinimide, almost exactly matching the range recited in Claim 6.

It would have been obvious to one of ordinary skill in the art to make the hydrocarbyl-substituted succinimide of Crawford in view of Papay further in view of Samson with the ratio of polyisobutylene to succinic acid taught by Lundberg in order to form a more active product.

22. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Papay further in view of Tokumoto as applied to Claim 5 above, and further in view of Lundberg.

The discussion of Crawford in view of Papay further in view of Samson in paragraph 17 above is incorporated here by reference. Crawford in view of Papay further in view of Tokumoto does not disclose a ratio between 1.0:1.0 and 1.0:1.6 of polyisobutene to succinic acid.

Lundberg, in column 19 lines 36-37, discloses a ratio of between 1.0:1.0 and 1.0:1.5 of polyisobutylene to succinic acid in a hydrocarbyl-substituted succinimide, almost exactly matching the range recited in Claim 6.

It would have been obvious to one of ordinary skill in the art to make the hydrocarbyl-substituted succinimide of Crawford in view of Papay further in view of

Tokumoto with the ratio of polyisobutylene to succinic acid taught by Lundberg in order to form a more active product.

***Conclusion***

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Baxter (U.S. Pat. No. 6,525,149) provides examples of feedstocks for the production of highly reactive polybutylene containing various amount of isobutene.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Goloboy whose telephone number is 571-272-2476. The examiner can normally be reached on M-F 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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